

We claim:

1. An assembly for use with an electro-acupuncture device having at least two electrodes, said electrodes adapted to provide electrical stimulation to a user's skin when the device is secured to the skin, said electrodes defining an inter-electrode gap provided between the electrodes which separates the electrodes, said assembly comprising:

a scrim having a top surface and a bottom surface, said scrim provided with pores extending from the top surface to the bottom surface, wherein said top surface contacts the electrodes when the assembly is releasably applied to the electro-acupuncture device, and said bottom surface contacts the skin when the electro-acupuncture device is secured to the skin; and

a plurality of masses of hydrogel disposed on the scrim and permeating into the pores of the scrim such that the masses of hydrogel are present on the top surface and the bottom surface of the scrim,

wherein the masses of hydrogel are sized and positioned on the scrim such that, for at least one orientation of the scrim relative to the electrodes, any masses positioned within the inter-electrode gap when the assembly is releasably applied to the electro-acupuncture device do not bridge the electrodes.

2. The assembly of claim 1 wherein the masses of hydrogel are sized and dimensioned as dots having diameters less than the inter-electrode gap.

3. The assembly of claim 1 wherein the masses of hydrogel are sized and dimensioned as elongated strips having widths less than the inter-electrode gap even when deformed under contact with the electrodes and the skin.

5 4. The assembly of claim 1 wherein the masses of hydrogel are disposed on the top surface of the scrim, and said hydrogel permeates into the pores and being present at the bottom surface.

10 5. The assembly of claim 1 wherein the masses of hydrogel are disposed on the bottom surface of the scrim, said hydrogel permeating into the pores and being present at the top surface.

15 6. The assembly of claim 1 wherein the masses of hydrogel are disposed on the top surface and the bottom surface of the scrim, wherein for each mass of hydrogel disposed on the top surface there is a corresponding mass of hydrogel disposed on the opposite bottom surface.

20 7. The assembly of claim 1 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the masses of hydrogel are capable of providing electrical conduction from the electrodes, through the masses of hydrogel, and to the skin.

25 8. The assembly of claim 1 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the masses of hydrogel are capable of providing an impedance matching layer between the electrodes and the skin.

9. An assembly for use with an electro-acupuncture device having at least two electrodes, said electrodes having an electrode shape and providing electrical stimulation to a user's skin when the device is secured to the skin, said electrodes

defining an inter-electrode gap provided between the electrodes which separates the electrodes, said assembly comprising:

a nonporous carrier having a top surface and a bottom surface, said carrier provided with electrode-shaped cut-outs and an inter-cutout gap separating the cutouts, wherein said top surface contacts the electrodes when the assembly is releasably applied to the electro-acupuncture device, and said bottom surface contacts the skin when the device is secured to the skin; and

a plurality of solid masses of hydrogel disposed on the carrier over the cut-outs, wherein said masses of hydrogel are oriented on the carrier such that the masses of hydrogel do not contact each other.

10. The assembly of claim 9 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the masses of hydrogel are capable of providing electrical conduction from the electrodes, through the masses of hydrogel, and to the skin.

11. The assembly of claim 9 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the masses of hydrogel are capable of providing an impedance matching layer between the electrodes and the skin.

12. An assembly for use with an electro-acupuncture device having at least two electrodes, said electrodes providing electrical stimulation to a user's skin when the device is secured to the skin, said electrodes defining an inter-electrode gap provided between the electrodes which separates the electrodes, said assembly comprising:

a nonporous carrier having a top surface and a bottom surface, said carrier provided with holes punched through the carrier, wherein said top surface contacts the electrodes when the assembly is releasably applied to the electro-acupuncture device, and said bottom surface contacts the skin when the device is secured to the skin; and

a plurality of hydrogel plugs fitted through the holes, the ends of the plugs being exposed through the top surface of the carrier and the bottom surface of the scrim.

13. The assembly of claim 12 wherein the hydrogel plugs have diameters less than the inter-electrode gap even when deformed under contact with the electrodes and the skin.

14. The assembly of claim 12 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the hydrogel plugs are capable of providing electrical conduction from the electrodes, through the hydrogel plugs, and to the skin.

15. The assembly of claim 12 wherein, when the assembly is releasably applied to the device and the device is secured to the skin, the hydrogel plugs are capable of providing an impedance matching layer between the electrodes and the skin.

16. A nerve stimulation device comprising:

a housing having a bottom outer surface;

securing means for securing the housing to a user's skin;

at least two electrodes secured to the bottom outer surface of the housing, said electrodes providing electrical stimulation to a user's skin when the device is secured

to the skin, said electrodes defining an inter-electrode gap provided between the electrodes which separates the electrodes;

5 a scrim releasably applied to the bottom outer surface of the housing over the electrodes, said scrim having a top surface and a bottom surface, said scrim provided with pores extending from the top surface to the bottom surface, wherein said top surface contacts the electrodes when said scrim is applied to the housing, and said  
10 bottom surface contacts the skin when the housing is secured to the skin; and

a plurality of solid masses of hydrogel disposed on the scrim and permeating into the pores of the scrim such that the hydrogel is present on the top surface and the  
15 bottom surface of the scrim,

wherein the masses of hydrogel positioned within the inter-electrode gap when the scrim is releasably applied to the housing do not bridge the electrodes.

17. The nerve stimulation device of claim 16 wherein, when the  
20 scrim is releasably applied to the housing and the housing is secured to the skin, the masses of hydrogel are capable of providing electrical conduction from the electrodes, through the masses of hydrogel, and to the skin.

18. The nerve stimulation device of claim 16 wherein, when the  
25 scrim is releasably applied to the housing and the housing is secured to the skin, the masses of hydrogel are capable of providing an impedance matching layer between the electrodes and the skin.

19. A nerve stimulation device comprising:

a housing having a bottom outer surface;

securing means for securing the housing to a user's skin;

at least two electrodes secured to the bottom outer surface of the housing, said electrodes providing electrical stimulation to a user's skin when the device is secured to the skin, said electrodes defining an inter-electrode gap provided between the electrodes which separates the electrodes;

a nonporous carrier releasably applied to the bottom outer surface of the housing over the electrodes, said carrier having a top surface and a bottom surface, said carrier provided with cut-outs, wherein said top surface contacts the electrodes when said scrim is applied to the housing, and said bottom surface contacts the skin when the housing is secured to the skin; and

a plurality of solid masses of hydrogel disposed on the carrier and over the cutouts,

wherein the masses of hydrogel positioned within the inter-electrode gap when the carrier is releasably applied to the housing do not bridge the electrodes.

20. The nerve stimulation device of claim 19 wherein, when the carrier is releasably applied to the housing and the housing is secured to the skin, the masses of hydrogel are capable of providing electrical conduction from the electrodes, through the masses of hydrogel, and to the skin.

21. The nerve stimulation device of claim 19 wherein, when the carrier is releasably applied to the housing and the housing is secured to the skin, the masses of hydrogel are capable of

providing an impedance matching layer between the electrodes and the skin.

22. An electrical conduction medium comprising:

5 a scrim having a top surface and a bottom surface, said  
scrim provided with pores extending from the top surface  
to the bottom surface; and

masses of conductive hydrogel disposed on the scrim and  
permeating into the pores of the scrim such that the  
masses of hydrogel are present on the top surface and the  
10 bottom surface of the scrim,

wherein the masses of conductive hydrogel provide  
electrical conduction from the top surface of the scrim,  
through the pores of the scrim, to the bottom surface of  
the scrim.

15 23. An electrical conduction enhancing medium comprising:

a nonporous carrier having a top surface and a bottom  
surface, said carrier provided with cutouts; and

masses of conductive hydrogel disposed on the carrier and  
over the cutouts,

20 wherein the masses of conductive hydrogel provide  
electrical conduction from the top surface of the  
carrier, through the cutouts, to the bottom surface of  
the carrier.

24. A hydrogel patch for use with a pair of electrodes  
25 comprising:

a scrim having a top surface and a bottom surface, said  
scrim provided with pores extending from the top surface  
to the bottom surface; and

discrete masses of conductive hydrogel disposed on the  
scrim and permeating into the pores of the scrim such  
that the masses of hydrogel are present on the top  
surface and the bottom surface of the scrim,

wherein the masses of conductive hydrogel provide impedance  
matching between the top surface and the bottom surface.

25. An hydrogel patch comprising:

a nonporous carrier having a top surface and a bottom  
surface, said carrier provided with cutouts; and

discrete masses of conductive hydrogel disposed on the  
carrier and over the cutouts,

wherein the masses of conductive hydrogel provide impedance  
matching between the top surface and the bottom surface.

26. A device for applying electrical stimulation to the human  
body, said device comprising

source of electrical stimulation and a housing;

a pair of electrodes disposed on the housing and coupled to  
the source of electrical stimulation, said pair of  
electrodes being adapted to be applied to the human body,  
said pair of electrodes defining a known minimum distance  
between the electrodes;

a sheet of material adapted to be positioned between the  
pair of electrodes and the human body when the electrical



stimulation device is applied to the human body, said sheet of material comprising non-conductive material, said sheet characterized by a first side adapted for application to the human body and a second side adapted for application to the electrodes;

a first plurality of masses of conductive material disposed on at least one side of the sheet, said masses having at least one dimension which is smaller than the minimum distance between the electrodes.

27. The device of claim 26 wherein the sheet further comprises a porous material, and the first plurality of masses comprises strips of conductive hydrogel disposed on the sheet and penetrating the pores of the sheet to provide corresponding electrically conductive areas on the other side of the sheet.

28. An assembly for use with an electro-acupuncture device having at least two electrodes, said electrodes having an electrode shape and providing electrical stimulation to a user's skin when the device is secured to the skin, said electrodes defining an inter-electrode gap provided between the electrodes which separates the electrodes, said assembly comprising:

at least two nonporous carriers, said carriers provided with electrode-shaped cut-outs and an inter-cutout gap separating the cutouts, wherein one of the carriers contacts the electrodes when the assembly is releasably applied to the electro-acupuncture device, and the other carrier contacts the skin when the device is secured to the skin; and

a plurality of solid masses of hydrogel disposed between the carriers over the cut-outs, wherein said masses of

hydrogel are oriented on the carriers such that the masses of hydrogel do not contact each other,

wherein when the assembly is releasably applied to the device and the device is secured to the skin, the masses of hydrogel are capable of providing electrical conduction from the electrodes, through the masses of hydrogel, and to the skin.

29. The assembly of claim 28 further comprising a stiffening member, said stiffening member disposed between the carriers and within inter-cutout gap.